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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/592,950	06/13/2000	Xuesong Chen	9351-20/HSF	7043

1059 7590 02/03/2003

BERESKIN AND PARR  
SCOTIA PLAZA  
40 KING STREET WEST-SUITE 4000 BOX 401  
TORONTO, ON M5H 3Y2  
CANADA

EXAMINER
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ALEJANDRO, RAYMOND

ART UNIT	PAPER NUMBER
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1745

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DATE MAILED: 02/03/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/592,950

Applicant(s)

CHEN ET AL.

Examiner

Raymond Alejandro

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 27 December 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-16 is/are pending in the application.
- 4a) Of the above claim(s) 1-3 and 13-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-6, 9 and 10 is/are rejected.
- 7) ☒ Claim(s) 7, 8, 11 and 12 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 27 December 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 8. 6) ☐ Other:

## **DETAILED ACTION**

### ***Response to Amendment***

This office action is responsive to the amendment filed on 12/27/02. The applicants have overcome the objections, the 35 USC 112 and the 35 USC 103 rejections. However, the claims are finally rejected over new art as seen below.

### ***Election/Restrictions***

1. This application contains claims 1-3 and 13-16 drawn to an invention nonelected with traverse in Paper No. 4. A complete reply to the final rejection must include cancelation of nonelected claims or other appropriate action (37 CFR 1.144) See MPEP § 821.01.

### ***Drawings***

2. The proposed drawing correction and/or the proposed substitute sheets of drawings, filed on 12/27/02 has been approved. A proper drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The correction to the drawings will not be held in abeyance.

### ***Claim Rejections - 35 USC § 103***

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
4. Claims 4-6 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Condit et al 6416891.

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The instant application is directed to a fuel cell system wherein the claimed inventive concept comprises the specific catalytic reactor arrangement. Other limitations include the fuel cell stack, the particular reactor configuration and connections.

With respect to claim 4, 9-10:

Condit et al disclose an operating system for a fuel cell power plant (abstract) wherein the fuel cell comprises a plurality of fuel cells typically arranged in a stack surrounded by an electrically insulating frame structure that defines manifolds for directing flow reducing, oxidant, coolant and product fluids; each individual cell generally includes an anode electrode and a cathode electrode separated by an electrolyte (col 1, lines 19-24); wherein a reactant or reducing fluid such as hydrogen is supplied to the anode electrode, and an oxidant such as oxygen or air is supplied to the cathode electrode. In a cell utilizing a proton exchange membrane (PEM) as the electrolyte, the hydrogen electrochemically reacts at a surface of the anode electrode to produce hydrogen ions and electrons (col 1, lines 25-30). It is further disclosed that a solid polymer electrolyte is well-known in the art (col 1, lines 39-41). It is further disclosed that fuel cells utilizing PEM electrolytes typically involves securing an appropriate first catalyst layer between a first surface of the PEM and a first or anode porous substrate layer to form an anode electrode adjacent the first surface of the PEM, and securing a second catalyst layer between a second surface of the PEM opposed to the first surface and a second or cathode porous substrate layer to form a cathode electrode on the opposed second surface of the PEM; the anode catalyst, PEM, and cathode catalyst secured in such a manner are well-known in the art, and are frequently referred as to a membrane electrode assembly (col 1, lines 54-65).

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It is also disclosed that the operating system includes fuel processing component means for processing hydrocarbon fuels into reducing fluids appropriate for providing fuel to an anode electrode of the fuel cell (col 12, line 65 to col 13, line 1). *The fuel processing component means may include a burner that may be a conventional or preferably a catalytic burner that oxidizes any excess reducing fluid such as hydrogen fed to the burner as an anode exhaust stream through the anode exhaust passage after passing through the anode flow field; and a first reformer feed branch of the split oxidant passage secured in fluid communication with the inlet branch of the split oxidant passage and with the burner that directs a portion of the process oxidant stream into the burner; a reformer that receives a combusted burner exhaust stream from the burner in the reformer feed line between the burner and the reformer; and a reformed fuel discharge line that directs reformed fuel from the reformer into the reducing fluid inlet (col 13, lines 3-22). Therefore, the combusted burner exhaust stream within the reformer feed line may be supplemented by, or replaced by a portion of the process oxidant stream directed to the reformer feed line (col 13, lines 25-30).*

As for claim 5:

The fuel cell comprises a plurality of fuel cells typically arranged in a stack surrounded by an electrically insulating frame structure that defines manifolds for directing flow reducing, oxidant, coolant and product fluids (col 1, lines 18-22).

With respect to claims 6:

It is disclosed that the catalytic combustor receives the particular reactant streams through conduits (col 5, lines 35-40 and col 6, lines 9-12).

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Condit et al disclose a fuel cell operating system according to the foregoing. However, Micheli et al does not specifically disclose the particular catalytic reactor and its tubular shape.

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to use the particular catalytic reactor as Condit et al disclose that the fuel processing component mean includes a burner that may be preferably a catalytic burner that oxidizes any excess reducing fluid. Thus, those of ordinary skill in art would understand that catalytic reactors can be employed because they facilitate oxidation reaction of fuel and generate water, and operate at suitable low temperatures ranges. Accordingly, this fuel cell system may provide a thermodynamically optimized system for electrical power production due to the specific power generating elements configuration. Further, the cycle efficiency can be enhanced by adding all of the heat energy obtained from unreacted and reacted stream effluents to/from the fuel cell anode and cathode and/or supply source. Moreover, this arrangement thus provide the heat and humidity required for proper operation of the fuel cell system.

As to the specific reactor shape, it would have been obvious to one skilled in the art at the time the invention was made to recognize that Condit et al inherently disclose tubular combustors, as Condit et al's catalytic combustors are in fluid communication with conduits for receiving and exhausting streams, and hence, since those conduits are either pipes or tube through which the fluid is conveyed, it would be obvious to make the combustor having a similar configuration so as to enhance fluid transmission or distribution throughout the entire fuel cell system.

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***Allowable Subject Matter***

5. The following is a statement of reasons for the indication of allowable subject matter: a reasonable search for the prior art failed to reveal or fairly suggest what is instantly claimed, particularly: the specific catalytic reactor connecting (structural) arrangement as recited in claims 7-8; as well as the specific catalytic reactor structural arrangement and the second catalytic reactor as recited in claims 11-12.

6. Claims 7-8 and 11-12 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

***Response to Arguments***

7. Applicant's arguments with respect to claims 4-6 and 9-10 have been considered but are moot in view of the new ground(s) of rejection.

***Conclusion***

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period

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will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (703) 306-3326. The examiner can normally be reached on Monday-Thursday (8:30 am - 7:00 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's primary examiner, Steve Kalafut can be reached on (703) 308-0433. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Raymond Alejandro  
Examiner  
Art Unit 1745



STEPHEN KALAFUT  
PRIMARY EXAMINER  
GROUP

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